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DEPARTMENT OF DEFENSE PROCUREMENT POLICY

REFORM: AN EVOLUTIONARY PERSPECTIVE

William Gates

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The Office of Secretary of Defense (OSD) was established in 1947 and evolved into the Department of Defense (DOD) in 1949. At least part of the reason for forming DOD was to coordinate, rationalize, and increase the efficiency of the defense sector's procurement process. Since its inception, DOD's procurement policies have been studied extensively, a multitude of reforms have been recommended, and many reforms have been implemented. However, after almost 40 years, analysts are still recommending reforms to improve coordination and rationality, and to increase the efficiency of DOD's procurement policies.

This paper will trace the evolution of DOD's procurement policies over the last forty years. It will concentrate on five major reform efforts: the McNamara era; the Packard initiatives; OMB Circular A-109; the Acquisition Improvement Program (Carlucci); and the President's Blue Ribbon Commission on Defense Management (Packard Commission). The analysis will discuss the problems addressed, the reforms recommended to alleviate them,

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the mechanisms to implement the reforms, and their success. Finally, the paper will discuss two recurring themes evident in these reform efforts: the increasing emphasis on quantitative measures of program performance and the increasing number of offices and committees with responsibility for overseeing the procurement process.

DEPARTMENT OF DEFENSE PROCUREMENT POLICY REFORM:

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William Gates

January 1989

Department of Defense Procurement Policy Reform: An Evolutionary Perspective*

William Gates**

An important factor in assessing federal procurement policy reform is understanding the environment in which these reforms must be implemented. This paper will describe the Department of Defense (DOD) environment by tracing the history of DOD procurement reforms. After describing this evolution, patterns from past reforms and their implications for the future will be discussed.

Procurement policy involves several elements. At one extreme are the detailed procurement regulations embodied in the Federal Acquisition Regulations (FAR) and in the various Service directives and instructions. At the other extreme are the global policy issues, such as military strategy and the perceived threat, that indirectly influence the procurement environment. The middle ground includes general procurement procedures and guidelines. This paper will focus on the middle ground, including the shortcomings of the process as perceived by the participants and the reforms recommended to correct these shortcomings.

The starting point for this analysis is the late 1940s. Dissatisfaction with defense procurement undoubtedly existed before this time. However, the late 1940s is a logical starting point. The Office of the Secretary of Defense (OSD) and DOD were both formed in the late 1940s, to integrate and coordinate the Services. Defense procurement was one important aspect of DOD's responsibilities. In addition, there wasn't really a defense industry before the late 1940s. Weapons procurement did not require long lead times and there was no imminent threat to the U.S. homeland. Therefore, the U.S. had sufficient time to convert commercial manufacturing facilities to military production when needed. When, the U.S. became the first line of defense in Europe, and weapon technologies became increasingly complex and distinct from commercial technologies, the U.S. began developing a defense-related industrial capability.

Considering this background, this study will describe the history of DOD procurement reforms from the late 1940s to the present. More specifically, procurement reforms will be grouped into several eras: early DOD (1947-1960), McNamara (1961-1969), Packard (1969-1972), OMB Circular A-109 (1976), Carlucci (1980-1983), Congressional initiatives (1983-1985), and the Packard Commission (1986). In each era, the discussion will consider the perceived problems, perceived causes, symptoms, recommendations, and actions. After examining these reforms, recurring patterns observed in past reforms will be discussed.

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**Naval Postgraduate School, Monterey, CA. The ideas expressed in this paper are the author's and do not necessarily represent the views of the Naval Postgraduate School or the Department of the Navy.

PROCUREMENT REFORM HISTORY

Early DOD[1]

During the period before OSD and DOD were formed, it was generally agreed that coordination in the defense sector was becoming increasingly important. Changes in the weapons technology blurred the traditional distinctions between the Services (e.g., is an intercontinental ballistic missile (ICBM) an unmanned aircraft, or a long range artillery system?); changes in military strategy increased the importance of integrating the Services; changes in the military environment added to the variety of conflicts the U.S. had to be prepared to fight.

There were several symptoms indicating that the procurement process was not well coordinated. Ambiguities between Service missions and attempts by the Services to expand their roles led to interservice competition and overlapping weapons programs in some areas (e.g., ICBMs). In other areas, there were imbalances and inconsistencies in the Services' strategies, capabilities, and requirements (e.g., the Air Force was preparing for short-duration full-scale nuclear exchanges while the Army was preparing for drawn out conventional conflicts).

In part, these overlaps and inconsistencies persisted because each Service established its own military requirements and received its procurement appropriations directly from Congress. There was no OSD or DOD to help coordinate these requirements. These inconsistencies were compounded because the budget planning horizon was only one year (out-year budget requirements were not considered). Therefore, many hardware development projects were approved with no insight into later year budget implications. Programs had to be canceled or delayed as later budgets were insufficient to support the programs as planned.

The Administration's ability to coordinate the defense sector was also limited. The Services established their requirements independently of a military budget constraint. At the same time, the Administration determined the military budget independently of hardware requirements. There was no central mechanism to resolve discrepancies between requirements and the budget. This lead to gaps between programs and imbalances within programs. Furthermore, the budget was the Administration's only tool to influence the Services' weapons portfolio. This led to gaming behavior (and allegedly some inefficient decisions) as the Services' tried to increase their budgets and the President tried to influence the Services.

The response to these problems was to create a centralized defense authority, limit the Services' power, and make both the Services and the Joint Chiefs of Staff (JCS) more responsive to an overall DOD perspective. The organizational remedies were embodied in several initiatives: the National Security Act of 1947 created the National Security Council and the Office of the Secretary of Defense (initially not a cabinet-level position); the National Security Reorganization Act of 1949 made DOD an Executive Department and down graded the Military Departments; Reorganization Plan No. 6 (1953) expanded OSD's staff and authority; and, the Reorganization Act of 1958 gave the Secretary of Defense power to reorganize DOD and established the Unified and Specified commands by law (removing the Military Departments from the chain of command over the operating forces).

With regard to procurement regulations, The Armed Services Procurement Act of 1947 was the first formal unified defense procurement policy. This Act specified that whenever appropriate, the Services should advertise requirements to competing suppliers (e.g., items that are commercially available from multiple suppliers). When advertising was inappropriate (e.g., complex systems

[1]For a discussion of this period see References 1, 11, 18, 34, 36, 37, 43.

development projects), the Services were exempt from the requirements of the Act. In the late 1950s, risky and expensive weapon system development programs, particularly ballistic missiles, became increasingly prevalent. The increasing cost and technical uncertainty in these programs raised the government's concern over the contractors' performance. The government began monitoring the contractors' actions and attempting to influence their behavior through contract incentives. Formal advertising was inappropriate in these programs, so the Air Force issued a series of directives outlining an alternative policy. These directives, referred to as the 375 Series, laid the foundation for the systems approach promoted later by McNamara.

The McNamara Era[2]

When McNamara became SECDEF in 1961, the same problems continued to plague the defense sector. McNamara believed that implementation had been the primary shortcoming of the earlier reforms. The SECDEF had been given sufficient power and legal authority to provide central guidance, but not the staff and management tools required to actively exercise this authority.

McNamara characterized his management philosophy as a decision pyramid. The aim was to push all decisions to the lowest appropriate level. The top levels simply provided a framework to ensure that decisions were consistent with one another. Applying this philosophy to DOD procurement, McNamara felt that the Services should develop the alternatives to be considered; OSD should make the choices between alternatives. To implement this approach, OSD needed mechanisms to force alternatives to the surface, procedures to analyze them, and staff to conduct the analyses and make the decisions.

McNamara initiated a series of reforms to implement his management philosophy. To provide the required management tools, McNamara introduced the Programming-Planning-Budgeting System (PPBS), the Five Year Defense Plan (FYDP), and the Program Change Control System. The PPBS was designed to integrate the budget, requirements, and strategy in the annual program submissions formulated by the Services and OSD; the FYDP projected the implications of today's decisions on future defense budgets; and the Program Change Control System ensured that the FYDP reflected the latest decisions. In addition, McNamara established the Systems Analysis Office to provide the staff and analytical procedures required by the PPBS. The Joint Strategic Objectives Plan (JSCP), written annually by the JCS and Service Chiefs, served as McNamara's military strategy statement. Finally, McNamara established mission oriented budgets to provide better visibility into their relative priorities that the Services attached to the various military missions.

As the 1960s progressed, quantitative measures of program performance became increasingly important. These quantitative measures indicated that cost growth was becoming more significant. Therefore, McNamara introduced several initiatives to reduce costs and control cost growth. He introduced a program definition phase at the beginning of every program both to filter out ill-advised programs and provide better estimates of the required cost and time. He also encouraged value engineering and established a cost reduction program. The cost reduction program emphasized contractor competition and was expected to reduce costs by 25%. Because of seemingly excessive cost growth in cost-plus contracts, McNamara also emphasized incentive contracts and total package procurement. Finally, to enhance DOD's ability to monitor the contractors and Services, McNamara increased data reporting requirements and introduced should-cost analysis (a DOD cost analysis to determine how much a program "should" cost). Finally, the Selected Acquisition Reporting System (SAR) was introduced in 1968. The SARs summarize cost, schedule, and performance data on major acquisition programs. This was originally considered an internal management tool. However, the SARs also became the formal quarterly program report to Congress. Thus, they serve a dual role.

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[2]For a discussion of this period see References 1, 12, 17, 21, 23, 24, 25, 26.

During the 1960s, there was growing dissatisfaction with McNamara's approach to Defense management. The management philosophy was not the point of contention. In fact, most procurement reforms since McNamara have adopted a similar management philosophy. The controversy over McNamara's defense management centered on implementation. McNamara was criticized for excessive centralization, over-zealous implementation, over-reliance on quantitative measures, and inadequate recognition of asymmetric information.

Critics felt that most decisions were made at the top levels of OSD; by McNamara in particular. Furthermore, they felt that the decisions were based largely on quantitative measures developed by the Systems Analysis Office and did not reflect the Services' subjective opinions and expertise. The Systems Analysis Office was also criticized for taking too active a role in the decision-making process. The Office was not limited to performing analyses, it also initiated studies and made recommendations. Finally, the quantitative measures used to compare alternative programs were criticized because they essentially treated uncertainty as if it could be predicted, costed, and managed. Ever since McNamara, DOD procurement reforms have emphasized decentralization However, the emphasis placed on quantitative measures of program outcomes has not diminished.

The Packard Era[3]

When SECDEF Melvin Laird and DEPSECDEF David Packard took office in 1969, the generally acknowledged problems in the Defense sector included: excessive centralization; alleged inefficiencies in the acquisition process (i.e., cost growth); and a separation between decision making authority, responsibility for implementation, and accountability for the resulting outcome. The resulting symptoms included cost growth, schedule delays, and technical performance shortfalls; poorly defined programs; and increasing mistrust between DOD and the contractors.

Excessive competition was one of the most frequently cited cause for these problems. This included competition between contractors, between the Services, between the various federal departments, and between defense and other national priorities. Competition was seen as driving contractors to make optimistic projections regarding program costs, schedules, and technical performance. Neither the Services nor DOD challenged these claims because of interservice and interdepartmental competition for federal funds. Other contributing factors included under-qualified program managers, program turbulence, and inadequate testing and evaluation (which enabled programs to advance before technical uncertainties had been adequately resolved).

Laird and Packard felt the increased data requirements and management oversight introduced by McNamara had not resolved the earlier problems or their symptoms. It had simply increased management layering, made the acquisition process more complex, and separated decision making authority, responsibility, and accountability. Laird and Packard felt the appropriate response was to decentralize and streamline the acquisition process, increase program manager quality (including training, promotion opportunity, and tenure as program manager), improve the requirements setting process (to ensure that programs would be better defined), increase hardware testing (emphasizing prototypes whenever possible), and improve cost estimating procedures.

The Packard initiatives were designed to implement this response. These initiatives emphasized three basic areas: improving DOD's ability to monitor both the contractors and program managers; improving program manager quality, and improving the acquisition process and the quality of the programs themselves. These initiatives were embodied in ten major policy elements, first outlined by Mr. Packard in a series of memorandums and speeches (e.g., Packard memorandum of 28 May 1970, "Policy Guidance on Major Weapon System Acquisition"). The policy elements include:

[3]For a discussion of this time period see References 1, 6, 7, 8, 10, 19, 20, 22, 28, 47.

1. Provide for systematic program reviews by OSD officials at important program milestones (resulted in the DSARC - Defense Systems Acquisition Review Council).

2. Provide CSD with independent cost estimates and improve cost estimate quality by establishing a Cost Analysis Improvement Group (CAIG) within OSD.

3. Establish cost as a program objective, equal to schedule and performance in importance, and consider operations and support costs during the development process (design to cost and life-cycle costing).

4. Increase testing objectivity by establishing operational test and evaluation (OT&E) agencies that are independent of the Service commands responsible for the development effort.

5. Establish military training courses and schools to improve the program managers' training.

6. Give program managers a clear written charter to strengthen their authority.

7. Provide better promotion opportunities to attract superior officers to program management.

8. Reduce the turnover rate of program managers so that they have longer job tenure.

9. Resolve technological uncertainties during development, not during production (e.g., increase prototyping, emphasize early and more complete hardware testing, and reduce concurrency).

10. Encourage competitive hardware developments to reduce risk and stimulate contractor efforts.

The Packard initiatives had several characteristics in common with some of the later McNamara reforms and reforms initiated after Packard. They explicitly cited quantitative measures of program outcomes (including cost growth and to a lesser extent schedule delays and performance shortfalls) as evidence of acquisition inefficiencies, and they addressed these inefficiencies by attempting to both increase DOD's monitoring capability and improve program manager quality. The Packard initiatives also emphasized decentralization and streamlining the acquisition process. This is contrary to the preceding reforms but has been echoed in the succeeding reforms.

OMB Circular A-109[4]

During the mid-1970s, there was increasing concern that the acquisition inefficiencies observed in DOD (e.g., cost growth, etc.) were common to all federal agencies. There was also increasing concern that program definition and need justification were inadequate. This resulted in ill-advised program starts leading to wasteful cancellations later in the development process.

To remedy these deficiencies, the Office of Federal Procurement Policy (OFPP) was established in the Office of Management and Budget (OMB). OFPP was chartered to develop an integrated national procurement policy (embodied in OMB Circular A-109). OMB A-109 essentially applied DOD's procurement policies to all federal agencies (in particular DOD Directive 5000.1). In addition, it added a new milestone to the front-end of the acquisition process. This milestone addressed the need for a development effort and required the sponsoring agency to consider all viable alternatives. A development project was justified if the item was necessary and an alternative solution could not be found.

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[4]For a further discussion of this time period see References 1, 2, 3, 7, 8, 19, 28, 51.

These actions had several impacts on DOD's acquisition process. OFPP represented a new federal agency with responsibility for DOD procurement policy, and OMB A-109 added another milestone to the acquisition process. These impacts seem counter to the earlier recommendations to reduce management layering, streamline the acquisition process, and balance responsibility, authority, and accountability. OMB A-109 also extended concern for quantitative measures of acquisition "inefficiencies" to other federal agencies. This indirectly reinforced DOD's increasing emphasis on these quantitative measures.

The Carlucci Era[5]

When Frank Carlucci became DEPSECDEF in 1980, alleged acquisition inefficiencies (cost growth, schedule delays, and performance shortfalls) continued to plague the defense acquisition process. There was also concern over the growing federal acquisition bureaucracy and increasing pressure to reduce the defense budget. In addition, inadequate provisions for the operational phase of a weapon system's life-cycle (e.g., support and readiness) emerged as an important problem.

To formulate a response, Carlucci established the Steering Group on Improving the Defense Acquisition System and Reducing System Costs. The Steering group identified concerns of six major constituencies: Congress/GAO were concerned about cost growth, schedule delays, and performance shortfalls; the Services were concerned about excessive management oversight by OSD and Congress; the program managers were concerned about excessive regulation and unrealistic demands; OSD was concerned about inadequate program planning, funding instability, and long acquisition periods; OMB/OFPP were concerned about inadequate program definition and justification, overly detailed specifications, and long acquisition periods; and industry was concerned about discouragement of capital investment, excessive regulation, overemphasis on price competition, and adversarial attitudes between DOD and the contractors.

To address these concerns, Carlucci established 31 initiatives. These initiatives can be roughly grouped into five categories: improve general management principles, increase program stability, improve forecasting and information, improve support and readiness, and reduce bureaucracy. Congress later added a thirty-second initiative calling for increased competition. Carlucci supported this initiative but had felt that it was implied in the other initiatives.

In developing these initiatives, Carlucci did not specifically distinguish between perceived problems, perceived causes, and symptoms (therefore, that distinction is not made here). Carlucci seemingly had preconceived ideas about the major problems and appropriate solutions. He jumped directly to recommendations without relating problems and solutions. This makes it difficult to determine if the Carlucci initiatives were appropriate for the perceived problems and causes.

The Carlucci initiatives emphasized several improvements suggested in earlier reforms, including: decentralization, improved federal management capabilities, and increased oversight. Carlucci also emphasized program stability which had not received much attention earlier.

Congressional Initiatives[6]

Based largely on the findings of the Presicents Private Sector Survey on Cost Control (the Grace Commission) and of House and Senate hearings, Congress legislated several procurement reforms in the mid-1980s. The motivation was the high defense procurement budget and the well publicized "overpriced" spare parts. According to Congress, these problems were caused by lack of competition, poorly specified needs and plans, inadequate testing, and unethical business practices. Symptoms included the familiar acquisition "inefficiencies" and a growing defense budget.

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[5]For a further discussion of this time period see References 9, 39, 40, 46, 48, 49, 50.
[6]For a further discussion of this time period see References 16, 41, 42, 44, 45, 52.

In general, Congress' resolution for these problems was legislation to increase Congress' input into the Federal acquisition process. For example, two of the more significant pieces of legislation were the Competition in Contracting Act and the Truth in Negotiations Act. The Competition in Contracting Act overhauled the procurement process to encourage increased competition. The Truth in Negotiations Act increased the Federal Government's ability to recapture perceived overcharges by the contractors. One of the most significant aspects of the Congressional initiatives is that they indicated Congress' intention to become a more active participant in the procurement process.

The Packard Commission[7]

The President's Blue Ribbon Commission on Defense Management (the Packard Commission) represents a more recent effort to stimulate procurement reform. The Packard Commission considered Defense management in general, and the acquisition process in particular. The Commission felt that the primary problems with overall defense management were instability and poor planning. The primary problems in the acquisition process were the familiar acquisition "inefficiencies" and overpriced spare parts. Thus, acquisition inefficiencies had been elevated from symptoms to perceived problems (symptoms and problems were not differentiated). The perceived causes of these problems included: the long duration of the acquisition process, program instabilities, gold plating, and program "buy-ins."

The Packard Commission offered several recommendations to alleviate these problems. They included streamlining the acquisition process (to decentralize procurement management and balance responsibility, authority, and accountability), increasing tests and prototyping, improving planning, and adopting the competitive firm model where appropriate. In addition, the Packard Commission suggested some budgeting innovations (stabilize programs by providing multi-year funding and authorizations). With the exception of the budgeting initiatives, the President endorsed the Packard Commission's recommendations in the National Security Decision Directive 219 (April 1986), and they were incorporated in the Defense Reorganization Act.

Past experience gives reason to be pessimistic about the expected improvements from the Packard Commission's recommendations (and this is supported by the DOD procurement scandal in June 1988). The problems and reforms identified by the Packard Commission are similar to the problems and reforms identified previously. The earlier reforms were not successful. There are no distinguishing characteristics suggesting these recommendations will be any different.

Summary of Procurement Reform History

For reference, the perceived problems, perceived causes, symptoms, recommendations, actions, and comments for each of the reform efforts are summarized in Table 1.

RECURRING PATTERNS AND THEMES IN PAST DOD PROCUREMENT REFORM EFFORTS

After examining the past DOD procurement reform efforts, at least two recurring themes become evident. There has been an increasing emphasis on quantitative measures of program performance. Cost growth, schedule delays, and technical performance shortfalls have been elevated from proxies to direct measures of program inefficiencies, and procurement reforms have focused on alleviating these symptoms rather than addressing the underlying problems. In addition, the number of players and viewpoints concerned with the federal acquisition process has increased, diffusing authority and accountability. This has persisted despite repeated recommendations to decentralize the procurement process and increase the responsibility, authority, and accountability of those most directly involved in the procurement process (e.g., the program manager). Both of these themes will be discussed briefly.

[7]For a further discussion of this time period see References 29, 30, 31, 32

TABLE 1

SUMMARY OF MAJOR DOD PROCUREMENT REFORM EFFORTS

	Early DOD	McNamara	Packard	OMB A-109	Carlucci	Congressional Initiatives	Packard Commission
Perceived Problems	Inadequate Central Coordination and Integration	Inadequate Central Coordination and Integration	Acquisition Inefficiencies, Authority, Responsibility, Accountability Seperated, Increasing Defense Budget	All Federal Agencies were Experiencing Acquisition "Inefficiencies." Too Many Ill Advised Program Starts	Inadequate Readiness, Excessive Bureaucracy, Program Instabilities	High Unit Procurement Costs, Expensive Spares, Growing Defense Budget, Declining Industrial Base	Cost Growth, Schedule Delays, Performance Shortfalls, High Unit Procurement Costs
Perceived Causes	Changes in Military Environment and Weapons Technology	Inadequate Response to Changes in Military Environment and Weapons Technology	Excessive Competition, PMs Underqualified, Management Layering, Inadequate Testing, Mistrusted Contractors	No Federal Acquisition Policy or Central Agency, Inadequate New Program Start Justifications	Not Specified	Inadequate Planning and Testing, Too Little Competition, Unethical Business Practices	Program Instability, Lengthening Acquisition Schedule, Gold Plating, Program "Buy-Ins"
Symptoms	No Central Direction, Poorly Coordinated Services, Ad Hoc Procurement	No Central Direction, Poorly Coordinated Services, Ad Hoc Procurement	Cost Growth, Schedule Delays, and Performance Shortfalls, Poorly Defined Programs	Cost Growth, Schedule Delays, and Performance Shortfalls, Poorly Defined Programs in all Agencies	Cost Growth, Schedule Delays, and Performance Shortfalls, Inadequate Readiness	Growing Defense Budget, High-Priced Spares, Cost Growth, Schedule Delays, Performance Shortfalls	Not Distinguished From Problems
Recommendations	Create Central Authority, Relieve Services of Operational Command, Est Unified Proc Policy	Integrate Requirements, Strategy, and Budget; Increase SECDEF's Staff and Management Tools	Decentralize Authority, Streamline, Improve PM Quality, Increase Testing, Improve Cost Estimates	Establish Federal Agency and Acquisition Policy, Add Requirement to Establish Mission Need	Reduce Bureaucracy, Improve Readiness, Increase Stability, Improve Forecasts	Constrain and Monitor Behavior Through Legislation	Streamline, More Tests & Prototypes, Competitive Firm Model, Better Plans, Multiyear Funding & Auth
Actions	Established DOD and Unified Commands, Reduced Services' Power, Armed Services Proc Act	Systems Analysis Office, PPBS, FYDP, JSOP, Program Definition, DCP Mission Oriented Budget	DSARC, CAIG, OT&E Agency, Increased PM Authority and Training, Stressed H/W Tests and Competitive Development	Established OFPP in OMB, Released OMB A-109, Added Phase 0 Program Milestone (Mission Need)	Defense Acquisition Improvement Program (31 Recommended Reform Initiatives)	Various Legislation: Defense Procurement Reform Act, Competition in Contracting Act, Etc.	Recommendations Embodied in Defense Reorganization Act, Multiyear Funding & Authorization Eliminated
Comments	Insufficient Staff and Tools in OSD	Excessive Centralization, Overzealous Analysts, Emphasized Quantification	Acquisition "Inefficiencies" Continued Despite Reforms	Created New Acquisition Agency, Increased Program Milestones	Perceived Problems Not Resolved	Increased Congressional Oversight of Process and Specific Decisions	Similar to Previous Reform Recommendations, Can Expect Similar Results

Fix the Problems, Not the Symptoms

Because DOD's procurement budget is so large, it is natural to question whether the funds are being used efficiently. A small inefficiency in DOD's procurement process could translate into a substantial waste of funds in absolute terms. Analysts would like an index that measures whether DOD's funds are being used efficiently. Unfortunately, there aren't any indices that directly measure procurement inefficiencies. This forces analysts to use quantitative measures of program outcomes as proxies for inefficiency. Cost growth has received the greatest emphasis, but schedule delays, technical performance shortfalls, and more recently high unit procurement costs and program turbulence, have also received attention. Discussions regarding inefficiencies in DOD's procurement process center on these quantifiable outcomes. Over time, the proxies have come to be viewed as program inefficiencies, and reforms have addressed these measures rather than the underlying causes.

It is important to remember that these factors are only proxies, they are not inefficiencies. Furthermore, they may not be good proxies. Cost growth is not necessarily inefficient if the weapon program is conducted efficiently but the initial cost estimate was low. Similarly, the absence of cost growth does not indicate efficiency if the initial cost estimate was excessive.

Focusing too much attention on these proxies can be counterproductive. Program data are ambiguous, difficult to interpret, and frequently misleading. As a result, it is difficult to determine if program inefficiencies are significant. Proxies can indicate that there is a problem when none exists, or vice versa. Because of the difficulties in interpreting the data, procurement reforms frequently focus on the proxy rather than the underlying causes of inefficiency. If the underlying problems are not corrected, the program inefficiencies will persist as well. Two alleged inefficiencies, cost growth and program turbulence, both addressed by recent procurement reforms, illustrate the difficulty of identifying inefficiencies, auses, and the appropriate solutions.

Cost Growth. Consider cost data from five major weapon system acquisition programs (Table 2). This data indicates that all programs experienced cost growth in real unit procurement costs. (This discussion assumes that the data has been properly corrected for inflation and changes in procurement quantities. While there is reason to question this assumption, measurement problems are beyond the scope of this analysis. Changes in the absolute values of program cost growth would not affect the discussion presented here.) There are several alternative ways to interpret this data. Formulating the appropriate response depends on identifying the correct interpretation.

TABLE 2

REAL UNIT PROCUREMENT COST GROWTH

WEAPON SYSTEM	TIME PERIOD	BASE YEAR DOLLARS	% UNIT COST GROWTH
BLACKHAWK	12/71 - 9/82	1971	29
M1 TANK	9/73 - 12/82	1972	37
BRADLEY	3/73 - 3/83	1972	210
APACHE	9/73 - 12/82	1972	61
PATRIOT	3/72 - 12/82	1972	113

Source: William Gates and Joseph L. Midler, Cost Growth in Major Army Weapon System Acquisitions: A Synthesis of Five Case Studies, AC-RR-85-004, Pasadena: Arroyo Center, Jet Propulsion Laboratory, California Institute of Technology, January 1985. (Reference 15)

Cost growth could result from mismanagement and fraud. This is consistent with the view that cost growth is a direct indication of program inefficiencies. In this case, the appropriate response is to improve DOD's cost management capabilities. As emphasized in recent reforms, this involves improving cost data, cost estimating techniques, and the qualifications of DOD's program managers. These reforms might be successful if cost growth results from mismanagement and fraud. However, such reforms will not be successful if cost growth is merely a signal of other problems.

An alternative explanation for cost growth has been referred to as the "winners curse."[8] Development and procurement costs are uncertain at the beginning of an acquisition program. In the selection process, potential contractors are asked to estimate their expected costs. These cost estimates are used as one factor in the selection process. Other factors being equal, the winning contractor will be the contractor that underestimates costs by the largest margin (in this case, cost underestimation is entirely inadvertent, arising from cost uncertainty). This introduces a selection bias toward programs with a predisposition for cost growth, even though the program may be conducted efficiently. In this case, cost growth is not inefficient. However, cost growth may be a signal that there are inefficiencies in the selection process. Furthermore, measures to improve DOD's cost management capabilities will neither reduce the level of cost growth nor eliminate the underlying inefficiency.

A third explanation for cost growth considers the impact of competition. Competitive pressures during the proposal process encourage contractors to make optimistic initial cost estimates (this is intentional rather than inadvertent cost underestimation). The Services and OSD have little incentive to challenge these estimates because they want Congress to fund the weapon system. Optimistic initial cost estimates increase the likelihood of cost growth later in the program when competition is eliminated. This is illustrated by the data for the five weapon systems considered above. Figure 1 shows real unit procurement cost growth in these programs as a function of the years from the production contract award. Cost estimates were relatively stable during development. When the weapon systems entered production, essentially eliminating potential competition, unit production costs increased dramatically. This pattern is consistent across four of the five weapon systems. The Blackhawk is the one exception. In this program, the contractor signed a series of annual contracts at the end of the competitive development effort. Therefore, the lack of competition was not felt until after the system entered production. This is when unit procurement costs began increasing in the Blackhawk program. The problems signaled by cost growth, the impacts on procurement efficiency, and the appropriate solutions are different in this instance than in either of the preceding cases.

Thus, there are several plausible explanations for cost growth. Before recommending procurement reforms it is important to establish that cost growth signals program inefficiencies (i.e., the proxies are good proxies), and then link the causes and solutions. Reforms will not be effective if they address the wrong causes. Recent procurement reforms imply that cost growth is caused by mismanagement and fraud. The proposed solutions involve improving DOD's cost management capabilities. These reforms will not reduce cost growth if it is caused by selection biases, over-optimistic projections or some other factor.

Program Turbulence. Program turbulence provides another example of the difficulty in identifying program inefficiencies and their causes. In general, program turbulence is thought to increase unit procurement costs. Changes in production schedules affect the timing of materials and component purchases. Production variances also affect overhead rates, learning economies, and scale economies. Both Carlucci and the Packard Commission felt program turbulence contributed to cost growth and other proxies for procurement inefficiencies. Both proposed initiatives to help stabilize production schedules (e.g., multi-year procurement, funding, and authorizations).

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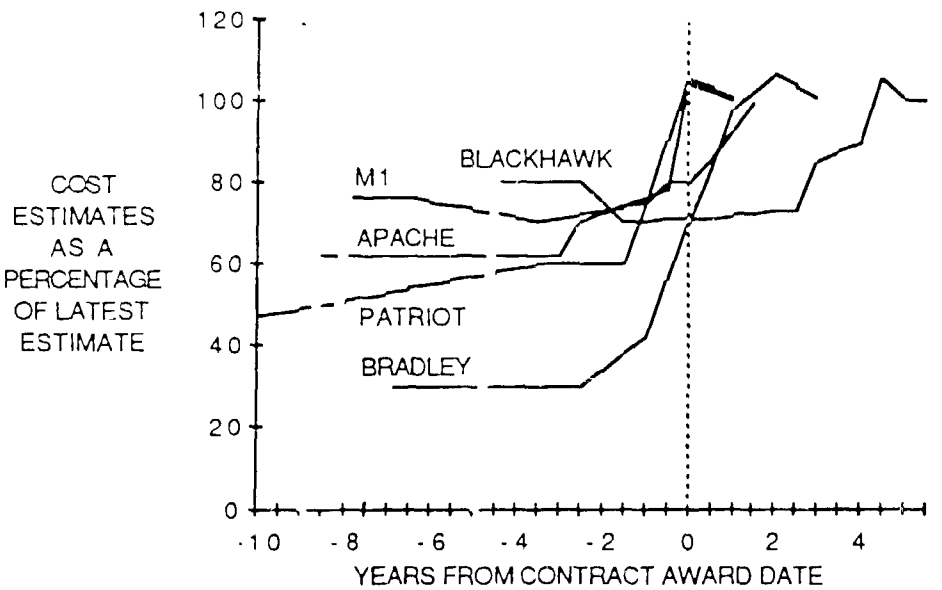
[8]For further discussion, see Quirk and Terasawa (Reference 33).

However, the case studies cited above (Reference 15) indicate that production schedule changes are caused by funding shortfalls (due to unanticipated inflation and increases in the contractors' unit cost estimates), unexpected technical problems, changes in the total procurement objective, and program funding changes. In other words, program turbulence is a symptom of several possible problems, not a cause of cost growth. In fact, program turbulence may be an efficient response to unavoidable and unpredictable changes in national priorities, the defense environment, or the program itself. If this is the case, efforts to stabilize high priority programs simply shift the burden of adjustment to unprotected programs. The cost of added turbulence in unprotected programs should be considered in deciding whether to stabilize high priority programs.

In addition, turbulence may affect program costs in ways not captured in observable data. Contractors understand that production rates in federal procurement projects change unexpectedly for unavoidable reasons. Therefore, they expect turbulence. Anticipated turbulence gives contractors an incentive to install flexible production facilities. Flexible production facilities are typically labor (variable input) intensive and have comparatively stable unit costs over a relatively wide range of production rates. The penalty for using flexible production facilities is higher unit production costs at the planned production rate. On the other hand, unit costs in flexible production facilities are lower if the actual production rates deviates significantly from the planned capacity. Observable program data does not capture the cost implications of selecting flexible production processes. Unit production costs will be higher if production rates remain at or near their planned levels; they will be lower if production turbulence is significant. Because these cost implications cannot be observed, it is impossible to determine if the cost of expected turbulence exceeds the benefit, or vice versa.

FIGURE 1



Source: William Gates and Joseph L. Midler, Cost Growth in Major Army Weapon System Acquisitions: A Synthesis of Five Case Studies, AC-RR-85-004, Pasadena: Arroyo Center, Jet Propulsion Laboratory, California Institute of Technology, January 1985. (Reference 15)

If I am Accountable, I Want the Responsibility and Authority

Decentralizing decisions to the appropriate level and balancing responsibility, authority, and accountability are themes that have recurred throughout most procurement reforms. The management philosophies underlying all reform proposals, including McNamara's, have stressed that authority and responsibility for general policy issues should be centralized while authority and responsibility for implementing these policies should be decentralized to the greatest extent possible. Centralizing general policy issues helps coordinate DOD's procurement process and avoids unnecessary waste and duplication. Decentralizing authority and responsibility helps ensure adequate flexibility to respond to changes in technology and the military environment. Finally, balancing responsibility, authority, and accountability at all levels of the procurement process helps promote efficiency. Presumably, inefficiencies are more likely when the responsible managers lack the required authority and cannot be held accountable for the results of their decisions.

Reforms through the early McNamara initiatives were designed to increase coordination by centralizing decisions. Reforms since then have stressed decentralization to increase flexibility, free the procurement process from institutional burdens (red tape), and promote the proper balance between responsibility, authority, and accountability. Despite the agreement, in principal, on the proper balance between centralization and decentralization, the continuing emphasis on decentralizing authority and increasing accountability indicates that the proper balance has not been achieved. Responsibility has been decentralized, but not authority and accountability.

In fact, structural changes in the defense sector have continuously centralized authority and diluted accountability. Since 1961, OSD has expanded from eight Assistant Secretaries and 2 Defense Agencies to 2 Under Secretaries, 12 Assistant Secretaries, and 12 Defense Agencies. In addition, OSD has advocates responsible for protecting the interests of several specific constituents (e.g., small and disadvantaged businesses). In the Executive Branch, OFPP was given responsibility for establishing a federal procurement policy in 1976. Within Congress, the number of committees and subcommittees overseeing DOD procurement policies has increased from 26 in 1970 to 96 in 1985 (Ref. 13, page 75). Similarly, the number of studies Congress has requested from DOD has increased by a factor of six (Table 3). Table 4 summarizes the various organizations concerned with the federal procurement process, and their respective responsibilities.

TABLE 3

CONGRESSIONAL DIRECTIONS TO DOD AND PAGES IN BUDGET JUSTIFICATION BOOK

	Required by Committee Reports		Required by Law	Pages in Budget Justification Book
	Studies	Other Actions		
1976	114	208	96	12,350
1977	129	184	97	-
1978	153	229	101	15,815
1979	177	213	109	-
1980	231	166	125	17,457
1981	223	180	138	-
1982	221	210	158	21,143
1983	325	120	183	21,753
1984	422	202	217	25,306
1985	458	113	213	26,757
1986	676	134	227	-

Source: U.S., General Accounting Office, Legislative Oversight: Congressional Requests for Information on Defense Activities, NSIAD-86-65BR, February 1986. (Reference 52)

While all participants are dedicated to the success of a program, different organizations have different objectives so success has several meanings. The President (as represented by OMB) and members of Congress must balance defense expenditures, macroeconomic considerations (e.g., inflation, unemployment, the budget deficit, etc.), and other national priorities (e.g., social programs, etc.). In addition, elected officials presumably have to consider reelection (either for the candidates personally or for their party). OSD has at least two objectives: providing an adequate national defense and minimizing discontent in the defense sector. The larger the defense budget, the easier it is to accomplish both objectives. The Services have the same concerns as OSD, but their viewpoint and loyalties are limited to their particular Service. Program managers are sensitive to the Service's objectives because their career advancement depends on the Service's evaluation of their performance. At the same time, program managers cannot be insensitive to the contractors because of concern for their future employment prospects. Contractors are motivated by profits. However, defense contractors probably consider long-term profits. They typically have on-going relationships with DOD. Therefore, they may be reluctant to exploit short-run profit opportunities if it would jeopardize their long-term relationship with DOD.

TABLE 4

FEDERAL ORGANIZATIONS CONCERNED WITH DEPARTMENT OF DEFENSE PROCUREMENT POLICY

ORGANIZATION	RESPONSIBILITIES
Congress	Negotiate the Overall Defense Budget Oversee Federal Procurement Policies and Regulations Establish Agency Missions (OFPP, Services, Etc.) Authorize Programs and Appropriate Funds Oversee Program Management (Committee Hearings, Staff Reports, GAO)
OMB	Negotiate the Overall Defense Budget
OFPP (OMB)	Establish Federal Procurement Policies and Regulations (Issue the FAR, Policy Letters, and Directives) Train the Federal Procurement Work Force (Federal Acquisition Institute) Collect Federal Procurement Data (Federal Procurement Data Center)
Federal Agencies	Protect Special Interests (Department of Labor, Small Business Administration)
OSD	Negotiate the Overall Defense Budget Finalize Defense Program Priorities Establish DOD Procurement Policies and Regulations to Implement the Federal Guidelines (Issue DOD Directives and Instructions) Oversee Program Management (DSARC, Defense Contract Audit Agency, Etc.) Carry Out Certain Activities Common to More Than One Service (Defense Agencies)
Services	Negotiate Service Budget Establish Service Program Priorities Establish Service Procurement Policies and Regulations to Implement the Federal and DOD Guidelines (Issue Service Directives, Regulations, and Instructions) Perform Program Management Field Completed Weapon Systems Provide Data Supporting Project Selection/Management Oversight Processes
Contractor	Execute Procurement Programs Provide Data to Support the Management and Project Selection Processes

The large number of cognizant organizations, and the diversity of their interests, diffuses authority and dilutes accountability. The program manager, who ultimately could be held responsible for the outcome of the project, is only one of several participants in the decision making process. Congress, OMB, OFPP, OSD, the Services, and advocates representing various special interest groups can all constrain the program manager's actions to ensure they satisfy the voluminous guidelines governing federal procurement. As a result, the program manager has limited authority and frequently is more concerned with the process than the results. The process is more directly accountable for the results than the participants.

At the same time, expanding the list of participants makes it more difficult to reform the procurement process. Organizations with different viewpoints typically perceive different problems. This was recognized by Verne Orr (former Secretary of the Air Force, Reference 27) and is illustrated by comparing the perceived problems and reforms recommended by different organizations (e.g., the differing concerns of the six constituencies identified by Carlucci). Similarly, different participant make different recommendations for correcting the perceived problems. Each organization typically believes that procurement problems can best be solved by increasing their own role. Thus, Congress has become more involved in project selection and micro-management. OMB/OFPP has established detailed procurement regulations. OSD has extended the formal review process to cover more of a program's life-cycle, particularly in the earlier phases, and reviews have become more concerned with detailed management decisions. OSD has also increased its ability to monitor contractors (e.g., the Cost Analysis Improvement Group and "should-cost" analysis). Finally, the Services have increased the level of detail specified in the contract. Even small design changes or changes in technical specifications are subject to Service review and must be incorporated into the procurement contract.

As the number of organizations increases, their viewpoints and vested interests become more narrowly defined. Furthermore, each office tends to view its responsibility or function as an end in itself, rather than a means to an end. Organizations become reluctant to give up responsibility or authority, and it is harder to obtain general agreement on procurement reform. Thus, the proliferation of organizations and management layers probably makes effective procurement reform more difficult.

CONCLUSIONS

Quantitative measures of procurement "efficiency" have received increasing attention since the early 1960s. This has generated widespread concern over perceived inefficiencies, including cost growth, schedule delays, performance shortfalls, and program turbulance. Unfortunately, these perceived inefficiencies have persisted despite several attempts to reform the procurement process. In part, past reform failures may have resulted from ambiguities in the program data. It is difficult to determine if the observed outcomes indicate that inefficiencies are significant, and if significant, it is difficult to determine the underlying causes. As a result, procurement reform may address the symptoms of inefficiency rather than the underlying causes.

Frustration over the symptoms' persistence has created a growing sense of mistrust. Congress mistrusts OSD; OSD mistrusts the Services; and Services mistrust the contractors. Initially, procurement reform tried to minimize the incidence of deception by improving program manager quality and providing better management tools. When these efforts failed, OMB, Congress, OSD, and the Services began taking more active program management roles. Program evaluations at all levels examined increasingly detailed management decisions, milestones and documentation requirements were increased, and independent testing agencies were added to monitor test results. This has lead to a proliferation of detailed procurement regulations, data requirements, and management layers, resulting in greater centralization and diluted authority and accountability. This trend has persisted despite repeated attempts to decentralize the process and balance responsibility, authority, and accountability.

It appears that decentralizing the procurement process (including authority) is impossible as long as there is a sense of mistrust. Without greater trust, Congress will not compromise their ability or authority to review the detailed management decisions made by OSD, the Services, and contractors. The same is true for OSD and the Services. For similar reasons, it is unlikely that procurement regulations can be reduced or generalized until mutual trust increases. As long as there is fear of deception, procurement reform is likely to follow the pattern of earlier reforms: increasing micro-management at all levels of the process.

To help solve this problem, it is useful to consider why this fear of deception persists. Mistrust arises, at least in part, from two related facts of the procurement process: the various participants have different objectives and possess different areas of expertise. For example, the contractors' primary objectives include maximizing long-term profits and they probably are most knowledgeable about expected costs, technical complexity, and their level of effort. The Services' primary objectives include maximizing their budget and the military role of their Service. They probably have the best information concerning their Service's military requirements and the most effective means to satisfy those requirements. OSD's objectives include maximizing OSD's budget and keeping the Services content. OSD is in the best position to assess overall military requirements. Finally, Congress is sensitive to their constituents and they are in the best position to balance defense programs against macroeconomic considerations and other national priorities.

Because different players have different information bases, there is an incentive for each organization to misrepresent its information and promote its own objectives. Unfortunately, it is difficult to detect misrepresented or biased information when the players have different areas of expertise. Furthermore, because organizations have different objectives, actions that promote one organization's objectives may be to the detriment of the other organizations. As a result, it is natural for the participants to mistrust each other. The response has been to increase management oversight, data requirements, and independent verification (e.g., should cost, independent testing, GAO analyses, etc.). These efforts have increased the procurement bureaucracy, but have not alleviated the fears of deception. Independent evaluations are imperfect because it is expensive (or impossible) to obtain independent information. Therefore, analysts typically rely on data provided by the organization being evaluated. Presumably, this data reflects the organization's biases.

An alternative approach to procurement reform would recognize the sense of mistrust, and its sources. One way to reduce mistrust is to structure the procurement process so that the players have common objectives. Specifically, procurement reform should address the incentives facing each of the constituents. This would require modifying contract incentive structures to influence the contractors' behavior. It would also require modifying the performance evaluation and reward system for government personnel involved in the procurement process. Modifications in these areas could help encourage all participants to report information truthfully and work toward comon objectives. (For some recent developments in this area of research see References 4, 5, and 14.) Mistrust will be lower if the incentive structure ensures that all participants are working toward common objectives. If procurement reforms continue to increase micro-management without changing the participants incentives, it is unlikely that future reforms will have any better success than past reforms.

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SUPPLEMENTARY

INFORMATION

development projects), the Services were exempt from the requirements of the Act. In the late 1950s, risky and expensive weapon system development programs, particularly ballistic missiles, became increasingly prevalent. The increasing cost and technical uncertainty in these programs raised the government's concern over the contractors' performance. The government began monitoring the contractors' actions and attempting to influence their behavior through contract incentives. Formal advertising was inappropriate in these programs, so the Air Force issued a series of directives outlining an alternative policy. These directives, referred to as the 375 Series, laid the foundation for the systems approach promoted later by McNamara.

The McNamara Era[2]

When McNamara became SECDEF in 1961, the same problems continued to plague the defense sector. McNamara believed that implementation had been the primary shortcoming of the earlier reforms. The SECDEF had been given sufficient power and legal authority to provide central guidance, but not the staff and management tools required to actively exercise this authority.

McNamara characterized his management philosophy as a decision pyramid. The aim was to push all decisions to the lowest appropriate level. The top levels simply provided a framework to ensure that decisions were consistent with one another. Applying this philosophy to DOD procurement, McNamara felt that the Services should develop the alternatives to be considered; OSD should make the choices between alternatives. To implement this approach, OSD needed mechanisms to force alternatives to the surface, procedures to analyze them, and staff to conduct the analyses and make the decisions.

McNamara initiated a series of reforms to implement his management philosophy. To provide the required management tools, McNamara introduced the Programming-Planning-Budgeting System (PPBS), the Five Year Defense Plan (FYDP), and the Program Change Control System. The PPBS was designed to integrate the budget, requirements, and strategy in the annual program submissions formulated by the Services and OSD; the FYDP projected the implications of today's decisions on future defense budgets; and the Program Change Control System ensured that the FYDP reflected the latest decisions. In addition, McNamara established the Systems Analysis Office to provide the staff and analytical procedures required by the PPBS. The Joint Strategic Objectives Plan (JSOP), written annually by the JCS and Service Chiefs, served as McNamara's military strategy statement. Finally, McNamara established mission oriented budgets to provide better visibility into their relative priorities that the Services attached to the various military missions.

As the 1960s progressed, quantitative measures of program performance became increasingly important. These quantitative measures indicated that cost growth was becoming more significant. Therefore, McNamara introduced several initiatives to reduce costs and control cost growth. He introduced a program definition phase at the beginning of every program both to filter out ill advised programs and provide better estimates of the required cost and time. He also encouraged value engineering and established a cost reduction program. The cost reduction program emphasized contractor competition and was expected to reduce costs by 25%. Because of seemingly excessive cost growth in cost-plus contracts, McNamara also emphasized incentive contracts and total package procurement. Finally, to enhance DOD's ability to monitor the contractors and Services, McNamara increased data reporting requirements and introduced should-cost analysis (a DOD cost analysis to determine how much a program "should" cost). Finally, the Selected Acquisition Reporting System (SAR) was introduced in 1968. The SARs summarize cost, schedule, and performance data on major acquisition programs. This was originally considered an internal management tool. However, the SARs also became the formal quarterly program report to Congress. Thus, they serve a dual role.

[2]For a discussion of this period see References 1, 12, 17, 21, 23, 24, 25, 26.

During the 1960s, there was growing dissatisfaction with McNamara's approach to Defense management. The management philosophy was not the point of contention. In fact, most procurement reforms since McNamara have adopted a similar management philosophy. The controversy over McNamara's defense management centered on implementation. McNamara was criticized for excessive centralization, over-zealous implementation, over-reliance on quantitative measures, and inadequate recognition of asymmetric information.

Critics felt that most decisions were made at the top levels of OSD; by McNamara in particular. Furthermore, they felt that the decisions were based largely on quantitative measures developed by the Systems Analysis Office and did not reflect the Services' subjective opinions and expertise. The Systems Analysis Office was also criticized for taking too active a role in the decision-making process. The Office was not limited to performing analyses, it also initiated studies and made recommendations. Finally, the quantitative measures used to compare alternative programs were criticized because they essentially treated uncertainty as if it could be predicted, costed, and managed. Ever since McNamara, DOD procurement reforms have emphasized decentralization. However, the emphasis placed on quantitative measures of program outcomes has not diminished.

The Packard Era[3]

When SECDEF Melvin Laird and DEPSECDEF David Packard took office in 1969, the generally acknowledged problems in the Defense sector included: excessive centralization; alleged inefficiencies in the acquisition process (i.e., cost growth); and a separation between decision making authority, responsibility for implementation, and accountability for the resulting outcome. The resulting symptoms included cost growth, schedule delays, and technical performance shortfalls; poorly defined programs; and increasing mistrust between DOD and the contractors.

Excessive competition was one of the most frequently cited cause for these problems. This included competition between contractors, between the Services, between the various federal departments, and between defense and other national priorities. Competition was seen as driving contractors to make optimistic projections regarding program costs, schedules, and technical performance. Neither the Services nor DOD challenged these claims because of interservice and interdepartmental competition for federal funds. Other contributing factors included under-qualified program managers, program turbulence, and inadequate testing and evaluation (which enabled programs to advance before technical uncertainties had been adequately resolved).

Laird and Packard felt the increased data requirements and management oversight introduced by McNamara had not resolved the earlier problems or their symptoms. It had simply increased management layering, made the acquisition process more complex, and separated decision making authority, responsibility, and accountability. Laird and Packard felt the appropriate response was to decentralize and streamline the acquisition process, increase program manager quality (including training, promotion opportunity, and tenure as program manager), improve the requirements setting process (to ensure that programs would be better defined), increase hardware testing (emphasizing prototypes whenever possible), and improve cost estimating procedures.

The Packard initiatives were designed to implement this response. These initiatives emphasized three basic areas: improving DOD's ability to monitor both the contractors and program managers; improving program manager quality; and improving the acquisition process and the quality of the programs themselves. These initiatives were embodied in ten major policy elements, first outlined by Mr. Packard in a series of memorandums and speeches (e.g., Packard memorandum of 28 May 1970, "Policy Guidance on Major Weapon System Acquisition"). The policy elements include:

[3]For a discussion of this time period see References 1, 6, 7, 8, 10, 19, 20, 22, 28, 47.